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Sidebar: Plugging into DC

News Story by Robert L. Mitchell

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(COMPUTERWORLD) - Industrial Light & Magic found an innovative way to gain power efficiencies and reduce heat in some of its blade-server racks. Eric Bermender, senior systems engineer, normally distributes 480-volt power inputs to a power-distribution unit and steps it down to three-phase 208-volt feeds to each rack. From there, power supplies on individual server blades convert the power to the appropriate DC voltages. But those power supplies were relatively inefficient and were big producers of waste heat. His two newest blade-server racks from San Diego-based Verari Systems Inc. don't use individual power supplies. Instead Bermender routes a 480-volt AC feed directly to the top of each rack, where it is converted to DC power that feeds each blade.

Because the conversion from 480 to 208 volts is skipped and the conversion from 208 volts to DC power is done in one step, the system is more efficient. Locating the power-conversion unit atop the system helps keep the blades within the racks cooler. Not only do the racks run more efficiently, but they solved another problem at ILM. "The entire rack has one plug where our other racks have six and seven," says Bermender. ILM's power distribution system only allocates four plugs per rack.

The units are too new for Bermender to comment on power savings, but his expectations are high. "We're pretty confident that we'll be saving anywhere from 10 to 20%," he says. While a typical server power supply runs at 65% efficiency, the Verari units claim conversion efficiencies in excess of 90%.

"DC offers some very clear benefits in terms of efficiency," says Peter Gross, CEO of consulting engineering firm EYP Mission Critical Facilities Inc. "A server running on a DC power supply is going to be more efficient, and there are other fans to be made in the overall distribution system," he adds.

But the idea of DC-powered data centers is controversial. Many servers don't support DC inputs today. According to Neil Rasmussen, chief technology officer at power systems vendor American Power Conversion Corp., the distribution of 48-volt DC power -- commonly used in telecommunications facilities -- would require bulky conductors. "There are big capital costs on converting your facility to DC power," says Jerry Murphy, an analyst at Robert Frances Group Inc.

Gross acknowledges that it's impractical to distribute DC power to large loads at 48 volts but says the problem can be overcome by increasing the distribution voltage to 480 volts and stepping it down at the rack level. "There are a number of strategies you can deploy to bring DC power to the server," he says.

Bermender has also experimented with DC power distribution -- and abandoned it. "We put it in for our networking gear, but it didn't work correctly," he says. The equipment ILM tested failed repeatedly, Bermender says, and the fact that most vendors' products don't support DC power left him with few options.

DC power distribution at the room level isn't ready for prime time, says Murphy. "For most businesses, it's probably premature to build your facility around DC power," he says.